

## REMARKS

The Examiner is thanked for the Official Action of July 10<sup>th</sup>, 2006.

### TELEPHONE INTERVIEW WITH EXAMINER

The Examiner is thanked for the opportunity to conduct a telephone interview on 12/26/2006. In the telephone interview the Examiner suggested a minor amendment to Claim 5 for clarification purposes. That amendment has been made with this submission. Further, the Examiner stated that once she noticed the previous claim amendment of “one hard ball in a ball mill without a binder” she basically conducted no further evaluation of Applicant’s previously submitted arguments and strictly based her present rejection on the newly added, non-allowable language.

Further, during our conversation Applicant pointed the Examiner to the previously submitted arguments that set forth support for “without a binder” and would like to ask the Examiner to please review the previously submitted arguments and amendments to this Application.

This request for reconsideration is intended to be fully responsive thereto.

### REJECTION UNDER 35 USC § 112

The Examiner has rejected previously amended claim 5 because she states that the claim contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had

possession of the claimed invention and further, that there appears to be no support in the specification for “ball in a ball mill without a binder”. Applicant respectfully disagrees.

A ball mill is common in the industry and should readily be understood by one skilled in the relevant art. However, in order to advance the application Applicant currently amends Claim 5 (relevant section) to read “a conductor-mixed electrode active material, which is a mixture of an electrode material having lithium, and a conductive material obtained by use of ~~at least one hard ball~~ in a ball mill without a binder, said conductor-mixed electrode active material is formed on a surface of said current collecting material.”

Applicant previously presented satisfactory evidence to the Examiner that considerable support existed in the Specification for “a ballmill without a binder,” as restated below:

Regarding claim 1 (now claim 5), a phrase, “without use of a binder”, has been added to further distinguish from the cited references, i.e., U.S. Patent No. 6667131B1 to Vitins et al. (hereinafter, Vitins et al.) and U.S. Publication No. 2003/0143477 to Goda et al. (hereinafter, Goda et al.). This language is fully supported by the description in the current specification especially in the paragraphs [0043] and [0064]. Here, the conductor-mixed active electrode material is such that the electrode active material and the conductive material are bound as stirring the electrode active material and the conductive material together in a ball mill without use of binder. This binding

occurs when the electrode active material is stirred with the conductive material and balls in the ball mill and the surfaces thereof induce defects, thereby binding the conductive material around the surfaces with that surfaces. No new matter has been added.”

#### REJECTIONS UNDER 35 USC § 102 AND § 103

The Examiner has maintained the previous rejections under §102 and §103 and has added nothing to these rejections. Applicant previously argued these rejections and restates them here.

#### REJECTION UNDER 35 U.S.C. 102(e) (Vitins et al.)

Claims 5-6 and 9-10 were rejected under 35 U.S.C. 102(e) as being anticipated by Vitins et al. The Examiner basically suggested that Vitins et al. discloses all the elements of claim 5. The Examiner also suggested that Vitins et al. discloses the use of lithium magnate as in claims 6 and 10 and the method of making the lithium rechargeable battery of claim 9.

The Examiner is respectfully suggested to review the amended claims. Claims after amendments are clearly different from Vitins et al.

Vitins et al. provides rechargeable lithium cells of the lithium-ion or the lithium-alloy type, in which the cathode material has a high capacity, and which can be used for alleviation of the consequences of the capacity loss as well as for subsequent charge-discharge cycling. In Example 4, lines 40-50, column 9, composite  $\text{Li}_2\text{Co}_{0.4}\text{Mn}_{1.6}\text{O}_4/\text{LiMn}_2\text{O}_4$  electrodes were made by mixing 85% by weight of mixed oxide (1:3.59 by weight), 10% by weight of

Shawinigan Black and 5% by weight of polymer binder. Here, the mixture was treated in a ball mill for 17 hours until a uniform material of ink-like consistency was formed. Vitins et al. uses the ball in the ball mill to stir the electrode active material, conductive material and a binder equally or consistently. The consistent stirring gives the entire material the ink-like consistency, which facilitates the coating of the electrode layer on the current collecting material.

In the present invention, the conductor-mixed electrode active material is obtained by stirring and mixing the electrode material having lithium and the conductive material in the ball mill without the binder. Unlike Vitins et al., this invention does not requires the ink-like consistency for coating the electrode layer on the current collecting material. No teaching or suggestion of the stirring and mixing without the binder is not taught or suggested in Vitins et al.

Because no binder is necessary to bind the electrode active material 24 and the conductive material 3, the resulted product is not covered by the binder generally acting as an insulator, thereby giving more effective electron migration between the electrode active material 24 and the conductive material. Furthermore, ion migration between the electrode active material 24 and the surrounding electrolyte becomes more effective. All these lead to good battery characteristics.

Using the binder as Vitins et al. to bind the electrode active material 24 and the conductive material 3 coats the electrode active material 24 with the insulator, i.e., binder, which restricts the electron migration between the electrode active material 24 and the conductive material. It also restricts the

ion migration between the electrode active material 24 and the surrounding electrolyte becomes more effective.

Accordingly, the binding without binder as disclosed in the present invention gives an significant difference from Vitins et al.

Regarding the Examiner's rejection of claims 6, 9, and 10, because of the same reasoning above, Vitins et al. should not be a reference to reject the claims based on 35 U.S.C. 103(a).

#### REJECTION UNDER 35 U.S.C. 103(a) (Vitins et al. and Goda et al.)

Claims 7-8 were rejected under 35 U.S.C. 103(a) as being unpatentable over Vitins et al. as applied to claims 5 and 9-10 above, and further in view of Goda et al. The Examiner suggested that Vitins teaches a lithium rechargeable battery ad described in the § 102(e) rejection and regarding claim 8, teaches a binder that anchors the electrode material to an aluminum current collector as in the Example 4. Then, the Examiner admitted that Vitins is silent to the current collector having more than one recess portions, which can become obvious when combining with the teaching of Goda et al.

Goda et al. discloses a battery electrode plate constructed by coating a core member with a mixture plate that chiefly includes an active material. As shown in FIGS. 2 and 3, the core member 1 has plan parts 5 formed with grooves 15, and the core member 1 is made of a metal sheet 3 which is formed with strips of first bowed portions 4 and second bowed portions 7 arranged parallel to each other along one direction X of the metal sheet 3 and

alternatively protruding one the front and back side of the metal sheet.

First of all, because Vitins et al. does not act as a prior art to reject the amended claim 5, the claim 7 should not be rejected based on the theory the Examiner introduced in this official action. However, claims 7 of the present invention was amended to read “ a surface on the current collecting material in contact with an electrode layer is rough” instead of having recesses. This is to clarify the difference between the present invention and Goda et al.

Surface roughness gives a larger surface area and enlarges the contacting surface with the electrical conduction assistant, which enables to gather larger electric current on the current collecting material.

This difference itself should be sufficient to overcome the Examiner’s rejection on this ground.

### Conclusion

Applicant asserts that there is adequate support in the specification for the exclusion of a binder. Applicant further asserts that amended claims 5-10 and dependent claims 12 and 13 define the invention over the prior art and notice to this effect is respectfully solicited. Applicant further respectfully requests that the Examiner please review Applicant’s previous response in full along with this submission. Applicant has either complied with all Examiner recommendations or has effectively argued against the Examiner’s objections/rejections and believes that all currently pending claims are now in condition for allowance. No new matter has been added.

Should the examiner believe further discussion regarding the above

claimed language would expedite prosecution he is invited to contact the undersigned at the number listed below.

Respectfully submitted,

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